MANONMANIAM SUNDARANAR UNIVERISTY,
TIRUNELVELI-12
SYLLABUS
UG - COURSES – AFFILIATED COLLEGES
Course Structure for MCA
(Choice Based Credit System)

(with effect from the academic year 2024-2025 onwards)

Semester-I				
Part	**Subject Status**	**Subject Title**	**Subject Code**	**Credit**
III	CORE I	DISCRETE MATHEMATICS	WCAM11	4
III	CORE II	ADVANCED PYTHON PROGRAMMING	WCAM12	4
III	CORE III	LINUX AND SHELL PROGRAMMING	WCAM13	4
III	CORE LAB I	ADVANCED PYTHON PROGRAMMING LAB	WCAL11	3
III	CORE LAB II	LINUX AND SHELL PROGRAMMING LAB	WCAL12	3
III	ELECTIVE I	ADVANCED OPERATING SYSTEMS	WCAE11	3
III	ELECTIVE II	ADVANCED COMPUTER NETWORKS	WCAE14	3

Total Marks: 100   Internal Exam: 25 marks + External Exam: 75 marks

A. **Scheme for internal Assessment**:
   Maximum marks for written test: **20 marks**
    3 internal tests, each of **I hour** duration shall be conducted every semester.
   To the average of the **best two** written examinations must be added the marks scored in. The **assignment** for 5 marks.

   The break up for internal assessment shall be:
   Written test- 20 marks; Assignment -5 marks   Total - 25 marks

B. **Scheme of External Examination**
   3 hrs. examination at the end of the semester
   A – Part : 1 mark question two - from each unit
   B – Part : 5 marks question one - from each unit
   C – Part : 8 marks question one - from each unit

➢ **Conversion of Marks into Grade Points and Letter Grades**

S.No	Marks	Letter Grade	Grade point (GP)	Performance
1	90-100	O	10	Outstanding
2	80-89	A+	9	Excellent
3	70-79	A	8	Very Good
4	60-69	B+	7	Good
5	50-59	B	6	Above Average
6	40-49	C	5	Pass
7	0-39	RA	-	Reappear
8	0	AA	-	Absent

➢ **Cumulative Grade Point Average (CGPA)**

$$CGPA = \frac{\Sigma\,(GP \times C)}{\Sigma C}$$

- **GP** = Grade point, **C** = Credit
- CGPA is calculated only for Part-III courses
- CGPA for a semester is awarded on cumulative basis

➢ **Classification**
   a) First Class with Distinction   : CGPA ≥ 7.5*
   b) First Class   : CGPA ≥ 6.0
   c) Second Class   : CGPA ≥ 5.0 and < 6.0
   d) Third Class   :   CGPA< 5.0

Nesamony Memorial Christian College, Marthandam

DISCRETE MATHEMATICS

Course Objectives
- To know the concepts of relations and functions
- To distinguish among different normal forms and quantifiers
- To solve recurrence relations , permutations & combinations
- To know and solve matrices, rank of matrix & characteristic equations
- To study the graphs and its types

Unit-I

Relations- Binary relations-Operations on relations- properties of binary relations in a set – Equivalence relations— Representation of a relation by a matrix -Representation of a relation by a digraph – Functions-Definition and examples-Classification of functions-Composition of functions-Inverse function

Unit-II

Mathematical Logic-Logical connectives -Well formed formulas – Truth table of well formed formula –Algebra of proposition –Quine's method- Normal forms of well formed formulas- Disjunctive normal form-Principal Disjunctive normal form-Conjunctive normal form-Principal conjunctive normal form-Rules of Inference for propositional calculus – Quantifiers- Universal Quantifiers- Existential Quantifiers

Unit-III

Recurrence Relations- Formulation -solving Recurrence Relation by Iteration- solving Recurrence Relations- Solving Linear Homogeneous Recurrence Relations of Order Two- Solving Linear Non homogeneous Recurrence Relations. Permutations-Cyclic permutation- Permutations with repetitions- permutations of sets with indistinguishable objects- Combinations- Combinations with repetition

Unit-IV

Matrices- special types of matrices-Determinants- Inverse of a square matrix-Cramer's rule for solving linear equations-Elementary operations -Rank of a matrix-solving a system of linear equations-characteristic roots and characteristic vectors-Cayley-Hamilton Theorem-problems

Unit-V

Graphs -Connected Graphs -Euler Graphs- Euler line-Hamiltonian circuits and paths – planar graphs – Complete graph-Bipartite graph-Hyper cube graph-Matrix representation of graphs

Text book
1. N.Chandrasekaran and M. Umaparvathi, Discrete mathematics, PHI Learning Private Limited, New Delhi, 2010.

Reference Books
1. Kimmo Eriksson &Hillevi Gavel, Discrete Mathematics & Discrete Models, Studentlitteratur AB, 2015.
2. Kenneth H. Rosen Discrete Mathematics and applications, Mc Graw Hill, 2012

ADVANCED PYTHON PROGRAMMING

Course Objectives:
- To acquire programming skills in core Python
- To learn Strings and function
- To develop object oriented skills in Python
- To comprehend various Python Packages
- To develop web applications using Django

Unit I

Introduction: Fundamental ideas of Computer Science - Strings, Assignment and Comments - Numeric Data types and Character sets – Expressions – Loops and Selection Statements: Definite iteration: the for Loop - selection: if and if-else statements - Conditional iteration: the while Loop

Unit II

Strings and Text Files: Accessing Characters and substrings in strings - Data encryption -Strings and Number systems- String methods – Text - Lists and Dictionaries: Lists – Dictionaries – Design with Functions: A Quick review - Problem Solving with top-down Design - Design with recursive Functions - Managing a Program's namespace - Higher-Order Functions

Unit III

Design with Classes: Getting inside Objects and Classes – Data-Modeling Examples – Building a New Data Structure – The Two – Dimensional Grid - Structuring Classes with Inheritance and Polymorphism – Graphical User Interfaces - The Behavior of terminal-Based programs and GUI-Based programs - Coding Simple GUI-Based programs - Windows and Window Components - Command Buttons and responding to events

Unit IV

Working with Python Packages: NumPy Library-Ndarray – Basic Operations – Indexing, Slicing and Iteration – Array manipulation - Pandas –The Series – The Data Frame - The Index Objects – Data Visualization with Matplotlib – The Matplotlib Architecture – pyplot – The Plotting Window – Adding Elements to the Chart – Line Charts – Bar Charts – Pie charts

Unit V

Django: Installing Django – Building an application – Project Creation – Designing the Data Schema - Creating an administration site for models - Working with Query Sets and Managers – Retrieving Objects – Building List and Detail Views

Text Book:

1. K.A. Lambert, "Fundamentals of Python: first programs", Second Edition, Cengage Learning, 2018 (Unit - I, II and III)
2. Fabio Nelli, "Python Data Analytics: With Pandas, NumPy, and Matplotlib", Second Edition, Kindle Edition, 2018 (Unit - IV)
3. Antonio Mele, "Django 3 By Example", Third Edition, 2020 (Unit - V)

LINUX AND SHELL PROGRAMMING

Course Objectives

- To teach principles of operating system including File handling utilities, Basic Linux commands, Scripts and filters.
- To familiarize fundamentals of shell (bash), shell programming, pipes, Control structures, arithmetic in shell interrupt processing, functions, debugging shell scripts.
- To impart fundamentals of file concepts kernel support for file, File structure related system calls (file API's).
- To facilitate students in understanding Inter process communication, semaphore and shared memory.
- To explore real-time problem solution skills in Shell programming.

Unit-I

Basic bash Shell Commands: Interacting with the shell-Traversing the file system-Listing files and directories-Managing files and directories-Viewing file contents. Basic Script Building: Using multiple commands-Creating a script file-Displaying messages-Using variables-Redirecting input and output-Pipes-Performing math-Exiting the script. Using Structured Commands: Working with the if-then statement-Nesting ifs-Understanding the test command-Testing compound conditions-Using double brackets and parentheses-Looking at case. (Book-1, Chapters: 3, 11, and 12)

Unit-II

More Structured Commands: Looping with for statement-Iterating with the until statement-Using the while statement-Combining loops-Redirecting loop output. Handling User Input: Passing parameters-Tracking parameters-Being shifty-Working with options-Standardizing options-Getting user input. Script Control: Handling signals-Running scripts in the background-Forbidding hang-ups -Controlling a Job-Modifying script priority-Automating script execution. (Book-1, Chapters: 13, 14, and 16)

Unit-III

Creating Functions: Basic script functions-Returning a value-Using variables in functions-Array and variable functions-Function recursion-Creating a library-Using functions on the command line. Writing Scripts for Graphical Desktops: Creating text menus-Building text window widgets-Adding X Window graphics. Introducing sed and gawk: Learning about the sed Editor-Getting introduced to the gawk Editor-Exploring sed Editor basics. (Book-1, Chapters: 17, 18, and 19)

Unit-IV

Regular Expressions: Defining regular expressions-Looking at the basics-Extending our patterns-Creating expressions. Advanced sed: Using multiline commands-Understanding the hold space-Negating a command-Changing the flow-Replacing via a pattern-Using sed in scripts-Creating sed utilities. Advanced gawk: Reexamining gawk-Using variables in gawk-Using structured commands-Formatting the printing-Working with functions. (Book-1, Chapters: 20, 21, and 22)

Unit-V

Working with Alternative Shells: Understanding the dash shell-Programming in the dash shell-Introducing the zsh shell-Writing scripts for zsh. Writing Simple Script Utilities: Automating backups-Managing user accounts-Watching disk space. Producing Scripts for Database, Web, and E-Mail: Writing database shell scripts-Using the Internet from your scripts-Emailing reports from scripts. Using Python as a Bash Scripting Alternative: Technical requirements-Python Language-Hello World the Python way-Pythonic arguments-Supplying arguments-Counting arguments-Significant whitespace-Reading user input-Using Python to write to files-String manipulation. (Book-1, Chapters: 23, 24, 25, and Book-2, Chapter: 14)

Text Book:
1. Richard Blum, Christine Bresnahan, "Linux Command Line and Shell Scripting BIBLE", Wiley Publishing, 3rd Edition, 2015.Chapters: 3, 11 to 14, 16 to 25.
2. Mokhtar Ebrahim, Andrew Mallett, "Mastering Linux Shell Scripting", Packt Publishing, 2nd Edition, 2018. Chapter: 14.

Reference Books:
1. Clif Flynt, Sarath Lakshman, Shantanu Tushar, "Linux Shell Scripting Cookbook ", Packt Publishing, 3rd Edition, 2017.
2. Stephen G. Kochan, Patrick Wood, "Shell Programming in Unix, Linux, and OS X", Addison Wesley Professional, 4th Edition, 2016.
3. Robert Love, "Linux System Programming", O'Reilly Media, Inc, 2013
4. W.R. Stevens, "Advanced Programming in the UNIX environment", 2nd Edition, Pearson Education, 2013
5. Graham Glass, King Ables, " UNIX for Programmers and Users", 3rd Edition, Pearson Education, 2003

ADVANCED PYTHON PROGRAMMING LAB

Course Objectives:

This course enables the students:

- To master the fundamentals of writing Python scripts
- To create program using elementary data items
- To implement Python programs with conditionals and loops
- To use functions for structuring Python programs
- To develop web programming with Django

Implement the following in Python:

1. Program using elementary data items, lists, dictionaries and tuples
2. Program using conditional branches, loops
3. Program using functions
4. Program using classes and objects
5. Program using inheritance
6. Program using polymorphism
7. Program using Numpy
8. Program using Pandas
9. Program using Matplotlib
10. Program for creating dynamic and interactive web pages using forms

LINUX AND SHELL PROGRAMMING LAB

Course Objectives

- To enable the students to study and understand the efficiency of Linux shell script.
- To demonstrate the File Backup process.
- To develop and implement the shell script for GUI processing.
- To develop and implement the shell script for IPC and Networking.
- To demonstrate PostgreSQL.

List of Programs

1. Write a Shell Script program to calculate the number of days between two dates.
2. Write a Shell Script program to check systems on local network using control structures with user input.
3. Write a Shell Script program to check systems on local network using control structures with file input.
4. Write a Shell Script program to demonstrate the script control commands.
5. Write a Shell Script program to demonstrate the Shell script function.
6. Write a Shell Script program to demonstrate the Regular Expressions.
7. Write a Shell Script program to demonstrate the sed and awk Commands.
8. Write a Shell Script program to demonstrate the File Backup process through creating a daily archive location.
9. Write a Shell Script program to create a following GUI tools.
   a) Creating text menus
   b) Building text window widgets
10. Write a Shell Script program to demonstrate to connect a PostgreSQL database and performing CRUD operations.

ADVANCED OPERATING SYSTEMS

Course Objectives:

The main objectives of this course are to:
- Enable the students to learn the different types of operating systems and their functioning.
- Gain knowledge on Distributed Operating Systems
- Gain insight into the components and management aspects of real time and mobile operating systems.
- Learn case studies in Linux Operating Systems

Unit:1 Basics of Operating Systems

Basics of Operating Systems: What is an Operating System? – Main frame Systems – Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems –Real-Time Systems – Handheld Systems – Feature Migration – Computing Environments -Process Scheduling – Cooperating Processes – Inter Process Communication- Deadlocks –Prevention – Avoidance – Detection – Recovery.

Unit:2 Distributed Operating Systems

Distributed Operating Systems: Issues – Communication Primitives – Lamports Logical Clocks –Deadlock handling strategies – Issues in deadlock detection and resolution-distributed file systems –design issues

Unit:3 Real Time Operating System

Realtime Operating Systems : Introduction – Applications of Real Time Systems – Basic Model of Real Time System – Characteristics – Safety and Reliability - Real Time Task Scheduling

Unit:4 Handheld System

Operating Systems for Handheld Systems: Requirements–Technology Overview–Handheld Operating Systems–Palm OS-Symbian Operating System-Android–Architecture of android– Securing handheld systems

Unit:5 Case Studies

Case Studies : Linux System: Introduction – Memory Management – Process Scheduling – Scheduling Policy - Managing I/O devices – Accessing Files- iOS :Architecture and SDK Framework - Media Layer - Services Layer - Core OS Layer - File System.

Text Books

1. Abraham Silberschatz; Peter Baer Galvin; Greg Gagne, "Operating System Concepts", Seventh Edition, John Wiley & Sons, 2004.
2. Mukesh Singhal and Niranjan G. Shivaratri, "Advanced Concepts in Operating Systems – Distributed, Database, and Multiprocessor Operating Systems", Tata McGraw-Hill, 2001.

Reference Books

1. Rajib Mall, "Real-Time Systems: Theory and Practice ",Pearson Education, India,2006
2. Pramod Chandra P. Bhatt, An introduction to operating systems, concept and practice, PHI,Third edition, 2010.
3. Daniel.P.Bovet&MarcoCesati,"UnderstandingtheLinuxkernel",3rdedition,O" Reilly,2005
4. Neil Smyth, "iPhone iOS 4Development Essentials–Xcode", Fourth Edition, Payload media,2011.

Related Online Contents [MOOC, SWAYAM,NPTEL, Websites etc.]
1. https://onlinecourses.nptel.ac.in/noc20_cs04/preview
2. https://www.udacity.com/course/advanced-operating-systems--ud189
3. https://minnie.tuhs.org/CompArch/Resources/os-notes.pdf

ADVANCED COMPUTER NETWORKS

Course Objectives:

The main objectives of this course are to:

- Have a detailed knowledge on the concept of networks
- Know the idea on protocols, OSI layers and its functions.
- Get knowledge on protocols used in different layers.
- Know about the function of Internet

Unit:1 INTRODUCTION

Introduction- data communications – networks – The internet – Protocols and standards OSI model - layers in OSI model – TCP/IP protocol suite – addressing – guided media – Unguided media.

Unit:2 DATA LINK LAYER

Switching – Circuit switched networks – datagram networks – virtual circuit networks – Framing –Flow and error control Multiple access – random access – wired Lan – wireless Lan – Cellular telephony – satellite networks

Unit:3 NETWOR K LAYER

Network layer – IP V4 addressing – IPV6 addressing – ICMP – IGMP –Network layer delivery –forwarding – unicast and multicast routing protocols

Unit:4 TRANSPORT LAYER

Transport layer – Process to process delivery – UDP -TCP -Congestion – congestion control – QoS– Techniques to improve QoS

Unit:5 APPLICATION LAYER

Domain name system – name space – domain name space – distribution of name space – DNS in the internet – remote logging - email – file transfer -Network management system – SNMP Protocol

Text Book
1. Data communications and networking – Behrouz A Forouzan McGraw Hill 4thReprint

Reference Books
1. Computer Networks – Tenenbaum -Pearson -2022
2. Computer networking –Kurose James F, Ross Keith W -Pearson – 2017
3. Data and computer communications – William Stallings – Pearson 2017
4. Computer networks and Internet – Douglas E Comer – Pearson - 2018

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
1. https://nptel.ac.in/courses/106105080
2. https://www.tutorialspoint.com/computer-networks/index.asp
3. https://www.javatpoint.com/computer-network-tutorial